

# SEQUENCE LISTING

<110> Ohmiya, Yoshihiro  
Nakajima, Yoshihiro

<120> Multiple gene transcription activity assay system

<130> SAEG129.016APC

<140> 10/555,544

<141> 2004-11-04

<150> JP2003-127629

<151> 2003-05-06

<150> JP2003-407564

<151> 2003-12-05

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<170> PatentIn version 3.1

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Ser Tyr Ala Gln Ile Phe Glu Thr Ser Cys Arg Leu Ala Val Ser Leu  
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Glu Lys Tyr Gly Leu Asp His Asn Asn Val Val Ala Ile Cys Ser Glu  
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Asn Asn Ile His Phe Phe Gly Pro Leu Ile Ala Ala Leu Tyr Gln Gly  
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Ile Pro Met Ala Thr Ser Asn Asp Met Tyr Thr Glu Arg Glu Met Ile  
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Lys Val Ile Val Ile Asp Ser Met Tyr Asp Ile Asn Gly Val Glu Cys  
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Val Phe Ser Phe Val Ser Arg Tyr Thr Asp His Ala Phe Asp Pro Val  
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Lys Phe Asn Pro Lys Glu Phe Asp Pro Leu Glu Arg Thr Ala Leu Ile  
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Met Thr Ser Ser Gly Thr Thr Gly Leu Pro Lys Gly Val Val Ile Ser  
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His Arg Ser Ile Thr Ile Arg Phe Val His Ser Ser Asp Pro Ile Tyr  
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His His Ala Phe Gly Leu Phe Thr Ala Leu Ala Tyr Phe Pro Val Gly  
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Thr Ile Gln Asn Tyr Lys Ile Ala Ser Ile Val Val Pro Pro Pro Ile  
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Met Val Tyr Leu Ala Lys Ser Pro Leu Val Asp Glu Tyr Asn Leu Ser  
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Ser Leu Thr Glu Ile Ala Cys Gly Gly Ser Pro Leu Gly Arg Asp Ile  
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Ala Asp Lys Val Ala Lys Arg Leu Lys Val His Gly Ile Leu Gln Gly  
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Tyr Gly Leu Thr Glu Thr Cys Ser Ala Leu Ile Leu Ser Pro Asn Asp  
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Arg Glu Leu Lys Lys Gly Ala Ile Gly Thr Pro Met Pro Tyr Val Gln  
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Val Lys Val Ile Asp Ile Asn Thr Gly Lys Ala Leu Gly Pro Arg Glu  
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Lys Gly Glu Ile Cys Phe Lys Ser Gln Met Leu Met Lys Gly Tyr His

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Gly Val Val Phe Ile Asp Ser Ile Pro Lys Gly Pro Thr Gly Lys Leu						
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agggtagctc cttacgtcca agcgaaaatt gtagatctta ccaccggaaa atctctgggg	1140
ccaaataaaa gaggagagct ttgttttaaa agtgagatca ttatgaaggg ctatttcaac	1200
aataaacaag ctacggaaga agccatcgat aaagaaggat ggttacattc tggagatgtt	1260
gggtattatg acgacgatgg tcatttcttc gtagtcgatc gtttaaagga acttatcaag	1320

tacaagggat atcaagtagc accggctgaa ctggagtggg tgcttttgca acatccatct	1380
attaaagatg cgggtgttac tggcgttccc gacgaagctg ctggagaact accaggtgct	1440
tgtatagttc tccaagaagg aaaaagtctt actgaacaag aaattattga ctatatagcc	1500
gaacgagttt cgccaactaa acgtatacgt ggtggagtgg tcttcgttga tgatattcct	1560
aaaggggcga ctggaaaact ggtcagaagt gaattacgaa aacttcttgc tcagaagaaa	1620
tcgaaactat aa	1632

<210> 9

<211> 1632

<212> DNA

<213> Wild Type Rhagophthalmus ohbai Orange Luciferase

<400> 9

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gacgctcaca ccgaggaagt agtatcttac gcggacattt tggaaaacag ctgtcgatta	180
gcaaaatgct acgaaaaacta tggattacgc caaaacagcg tcatatcggt gtgcagcgaa	240
aacagcacga tcttcttcta ccccgtaatt gccgctttgt atatgggagt cataacagca	300
accgtaaag atagttatac cgaacgggaa ttattggaaa ccttaaatat atcaaaaccg	360
gaattagtgt tctgctcgaa gaaagccatt aaaaatatga tggcattgaa aaggaacgtc	420
aattttatta aaaaggtagt acttttggat agtaaggaag acatgggcga agcccagtgt	480
cttagcaact ttatggcacg ctattcggaa cccaatttgg acgtaagaaa ttttaaacca	540
cgcgattttg atgctaaaga acaagtcgct ttgatcatgt cctcatcggg aacaaccggg	600
ctgccc aaag gggtcgtgtt aaccatcga aatttaagcg ttcgcttcgt aactgcaag	660
gatcccttat tcggcaatag aactattcca tcaacttcga ttttatctat cgttcccttc	720
catcatgcgt ttggaatgtt tacaacgttg tcttatttta tagtagggct tagagttgta	780
ttactgaaaa gattcgaaga gaagtttttc ttaagcacca ttgaaaagta cagaattcca	840
actatcgttc ttgcgcgcc cgtaatggta ttctagcta agagccctt agttgatcag	900
tacgatttgt ccagtattag agaagtcgct accggtggcg cacctgttgg aactgaagtg	960
gcagtggccg ttgcgaaacg gttgaaaatt ggcggaatcc ttcagggcta cggattgacc	1020
gaaacgtgtt gcgccgtatt aattaccct catgacgacg ttaaaacagg ttctaccggg	1080
agggtagctc cttacgtcca agcgaaaatt gtagatctta ccaccggaaa atctctgggg	1140

ccaaataaaaa gaggagagct ttgtttttaa agtgagatca ttatgaaggg ctatttcaac	1200
aataaacaag ctacggaaga agccatcgat aaagaaggat ggttacattc tggagatggt	1260
gggtattatg acgacgatgg tcatttcttc gtagtgcgac gtttaaagga acttatcaag	1320
tacaagggat atcaagtagc accggctgaa ctggagtggg tgcttttgca acatccatct	1380
attaaagatg ccggtgttac tggcgttccc gacgaagctg ctggagaact accaggtgct	1440
tgtatagtcc tccaagaagg aaaaagtctt actgaacaag aaattattga ctatatagcc	1500
gaacgagttt cgccaactaa acgtatacgt ggtggagtgg tcttcgttga tgatattcct	1560
aaaggggcga ctggaaaact ggtcagaagt gaattacgaa aacttcttgc tcagaagaaa	1620
tcgaaactat aa	1632

<210> 10

<211> 1632

<212> DNA

<213> Mutant Rhagophthalmus ohbai Green Luciferase of the Invention

<400> 10

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gccggcattc agctctacag ggccctgacc aacttctcct tcttgaggga ggccctgac	120
gacgcccaca ccgaggaggt ggtgtcttac gccgacatcc tggagaacag ctgtagactg	180
gctaagtgtc acgagaaacta cggcctgcgc cagaacagcg tgatctccgt gtgcagcgag	240
aatagcacca tcttcttcta ccccgatgac gccgccctgt acatgggcgt gatcaccgcc	300
accgtgaacg acagctacac cgagcgggag ctgctggaga ccctgaacat ctccaagccc	360
gaactggtgt tctgctccaa gaaggccatc aagaacatga tggccctgaa gaggaacgtg	420
aacttcatca agaagggtgg gctgctggac agcaaggagg atatgggcga ggcccagtgc	480
ctgagcaact tcatggcccc gtactccgag cccaacctgg acgtgagaaa cttcaagcca	540
agggacttgc acgccaagga gcaggtggcc cttattatgt cctcctctgg caccaccggc	600
ctgccaaagg gcgtggtgct gaccacacag aacctgagcg tgcgcttcgt ccaactgcaag	660
gacccctgt tcggcaccag aaccatcccc tccacctcca tctgtccat cgtgcccttc	720
caccacgcct tcggaatgtt cacaacctg tctacttca tegtgggcct gagagtgggtg	780
ctgctgaaga gattcgagga gaagttcttc ctgagcacca tcgagaagta cagaatccca	840
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tacgacctgt ccagcatcag agagggtggc accggcggcg cccctgtggg caccgaggtt	960

gccgtggccg tggccaagcg gctgaagatc ggcggcaccc tccagggcta cggcctgacc	1020
gagacctgct gcgccgtgct gatcaccccc cagcagcagc tgaagaccgg ctccaccggc	1080
agggtagccc cctacgtgca ggctaagatc gtggacctga ccaccggcaa gtccctggga	1140
cctaacaaga gaggcgagct gtgcttcaag agcgagatca tcatgaaggg ctacttcaac	1200
aacaagcagg ccaccgagga ggccatcgac aaggagggct ggctgcactc cggcgacgtg	1260
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tgcatcgtgc tccaggaggg caagagcctg accgagcagg agatcatcga ctacatcgcc	1500
gagcgagtgt ctcccaccaa gcgcacccg ggcgagtcg tcttcgtgga cgacatcccc	1560
aagggcgcca ccggcaagct ggtgagaagc gagctgcgga agctgctggc ccagaagaag	1620
tccaagctgt aa	1632

<210> 11

<211> 1632

<212> DNA

<213> Mutant Rhagophthalmus ohbai Orange Luciferase of the Invention

<400> 11

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gccggcattc agctctacag ggccctgacc aacttctcct tcctgaggga ggccctgac	120
gacgccaca ccgaggaggt ggtgtcttac gccgacatcc tggagaacag ctgtagactg	180
gctaagtgct acgagaacta cggcctgcgc cagaacagcg tgatctccgt gtgcagcgag	240
aatagcacca tcttcttcta ccccgatgac gccgccctgt acatgggcgt gatcacccgc	300
accgtgaacg acagctacac cgagcgggag ctgctggaga ccctgaacat ctccaagccc	360
gaactggtgt tctgctcaa gaaggccatc aagaacatga tggccctgaa gaggaacgtg	420
aacttcatca agaagggtgt gctgctggac agcaaggagg atatgggcga ggcccagtgc	480
ctgagcaact tcatggcccg gtactccgag cccaacctgg acgtgagaaa cttcaagcca	540
agggacttcg acgccaagga gcagggtggc cttattatgt cctcctctgg caccaccggc	600
ctgccaaagg gcgtggtgct gaccacaggg aacctgagcg tgcgcttcgt ccaactgcaag	660
gacccctgt tcggcaacag aaccatcccc tccacctcca tcctgtccat cgtgcccttc	720
caccacgcct tcggaatgtt cacaacctg tcctacttca tcgtgggcct gagagtgggtg	780

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ctgctgaaga gattcgagga gaagttcttc ctgagcacca tcgagaagta cagaatccca      840
acaatcgtgc tggccctcc tgtgatggtg ttcttggtta agagccccct ggtggaccag      900
tacgacctgt ccagcatcag agaggtggcc accggcggcg cccctgtggg caccgaggtt      960
gccgtggccg tggccaagcg gctgaagatc ggcggcatcc tccagggcta cggcctgacc     1020
gagacctgct gcgccgtgct gatcaccccc cacgacgacg tgaagaccgg ctccaccggc     1080
agggtagccc cctacgtgca ggctaagatc gtggacctga ccaccggcaa gtccctggga     1140
cctaacaaga gaggcgagct gtgcttcaag agcgagatca tcatgaaggg ctacttcaac     1200
aacaagcagg ccaccgagga ggccatcgac aaggagggtt ggctgcactc cggcgacgtg     1260
ggatactacg acgacgatgg acatttcttc gtggtggacc ggctgaaaga gctgatcaag     1320
tacaagggtt accaggtggc ccccgccgag ctggagtggc tgctgctcca gcacccatcc     1380
atcaaggatg ccggcgtgac cggcgtgccc gacgaggccg ccggcgagct gcccgcgccc     1440
tgcatcgtgc tccaggaggg caagagcctg accgagcagg agatcatcga ctacatcgcc     1500
gagcgagtgt ctcccaccaa gcgcatccgg ggcggagtcg tcttcgtgga cgacatcccc     1560
aagggcgcca ccggcaagct ggtgagaagc gagctgcgga agctgctggc ccagaagaag     1620
tccaagctgt aa                                                             1632

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```

<210> 12
<211> 543
<212> PRT
<213> Wild Type Rhagophthalmus ohbai Green Luciferase

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<400> 12

```

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Met Pro Asn Glu Ile Ile Leu His Gly Ala Lys Pro Arg Asp Pro Leu
1           5           10           15

```

```

Asp Leu Gly Thr Ala Gly Ile Gln Leu Tyr Arg Ala Leu Thr Asn Phe
20           25           30

```

```

Ser Phe Leu Arg Glu Ala Leu Ile Asp Ala His Thr Glu Glu Val Val
35           40           45

```

```

Ser Tyr Ala Asp Ile Leu Glu Asn Ser Cys Arg Leu Ala Lys Cys Tyr
50           55           60

```

```

Glu Asn Tyr Gly Leu Arg Gln Asn Ser Val Ile Ser Val Cys Ser Glu
65           70           75           80

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Asn Ser Thr Ile Phe Phe Tyr Pro Val Ile Ala Ala Leu Tyr Met Gly  
                     85                                    90                                    95

Val Ile Thr Ala Thr Val Asn Asp Ser Tyr Thr Glu Arg Glu Leu Leu  
                     100                                    105                                    110

Glu Thr Leu Asn Ile Ser Lys Pro Glu Leu Val Phe Cys Ser Lys Lys  
                     115                                    120                                    125

Ala Ile Lys Asn Met Met Ala Leu Lys Arg Asn Val Asn Phe Ile Lys  
                     130                                    135                                    140

Lys Val Val Leu Leu Asp Ser Lys Glu Asp Met Gly Glu Ala Gln Cys  
 145                                    150                                    155                                    160

Leu Ser Asn Phe Met Ala Arg Tyr Ser Glu Pro Asn Leu Asp Val Arg  
                     165                                    170                                    175

Asn Phe Lys Pro Arg Asp Phe Asp Ala Lys Glu Gln Val Ala Leu Ile  
                     180                                    185                                    190

Met Ser Ser Ser Gly Thr Thr Gly Leu Pro Lys Gly Val Val Leu Thr  
                     195                                    200                                    205

His Arg Asn Leu Ser Val Arg Phe Val His Cys Lys Asp Pro Leu Phe  
                     210                                    215                                    220

Gly Thr Arg Thr Ile Pro Ser Thr Ser Ile Leu Ser Ile Val Pro Phe  
 225                                    230                                    235                                    240

His His Ala Phe Gly Met Phe Thr Thr Leu Ser Tyr Phe Ile Val Gly  
                     245                                    250                                    255

Leu Arg Val Val Leu Leu Lys Arg Phe Glu Glu Lys Phe Phe Leu Ser  
                     260                                    265                                    270

Thr Ile Glu Lys Tyr Arg Ile Pro Thr Ile Val Leu Ala Pro Pro Val  
                     275                                    280                                    285

Met Val Phe Leu Ala Lys Ser Pro Leu Val Asp Gln Tyr Asp Leu Ser  
                     290                                    295                                    300

Ser Ile Arg Glu Val Ala Thr Gly Gly Ala Pro Val Gly Thr Glu Val  
 305 310 315 320

Ala Val Ala Val Ala Lys Arg Leu Lys Ile Gly Gly Ile Leu Gln Gly  
 325 330 335

Tyr Gly Leu Thr Glu Thr Cys Cys Ala Val Leu Ile Thr Pro His Asp  
 340 345 350

Asp Val Lys Thr Gly Ser Thr Gly Arg Val Ala Pro Tyr Val Gln Ala  
 355 360 365

Lys Ile Val Asp Leu Thr Thr Gly Lys Ser Leu Gly Pro Asn Lys Arg  
 370 375 380

Gly Glu Leu Cys Phe Lys Ser Glu Ile Ile Met Lys Gly Tyr Phe Asn  
 385 390 395 400

Asn Lys Gln Ala Thr Glu Glu Ala Ile Asp Lys Glu Gly Trp Leu His  
 405 410 415

Ser Gly Asp Val Gly Tyr Tyr Asp Asp Asp Gly His Phe Phe Val Val  
 420 425 430

Asp Arg Leu Lys Glu Leu Ile Lys Tyr Lys Gly Tyr Gln Val Ala Pro  
 435 440 445

Ala Glu Leu Glu Trp Leu Leu Leu Gln His Pro Ser Ile Lys Asp Ala  
 450 455 460

Gly Val Thr Gly Val Pro Asp Glu Ala Ala Gly Glu Leu Pro Gly Ala  
 465 470 475 480

Cys Ile Val Leu Gln Glu Gly Lys Ser Leu Thr Glu Gln Glu Ile Ile  
 485 490 495

Asp Tyr Ile Ala Glu Arg Val Ser Pro Thr Lys Arg Ile Arg Gly Gly  
 500 505 510

Val Val Phe Val Asp Asp Ile Pro Lys Gly Ala Thr Gly Lys Leu Val  
 515 520 525

Arg Ser Glu Leu Arg Lys Leu Leu Ala Gln Lys Lys Ser Lys Leu  
530 535 540

<210> 13

<211> 543

<212> PRT

<213> Wild Type Rhagophthalmus ohbai Orange Luciferase

<400> 13

Met Pro Asn Glu Ile Ile Leu His Gly Ala Lys Pro Arg Asp Pro Leu  
1 5 10 15

Asp Leu Gly Thr Ala Gly Ile Gln Leu Tyr Arg Ala Leu Thr Asn Phe  
20 25 30

Ser Phe Leu Arg Glu Ala Leu Ile Asp Ala His Thr Glu Glu Val Val  
35 40 45

Ser Tyr Ala Asp Ile Leu Glu Asn Ser Cys Arg Leu Ala Lys Cys Tyr  
50 55 60

Glu Asn Tyr Gly Leu Arg Gln Asn Ser Val Ile Ser Val Cys Ser Glu  
65 70 75 80

Asn Ser Thr Ile Phe Phe Tyr Pro Val Ile Ala Ala Leu Tyr Met Gly  
85 90 95

Val Ile Thr Ala Thr Val Asn Asp Ser Tyr Thr Glu Arg Glu Leu Leu  
100 105 110

Glu Thr Leu Asn Ile Ser Lys Pro Glu Leu Val Phe Cys Ser Lys Lys  
115 120 125

Ala Ile Lys Asn Met Met Ala Leu Lys Arg Asn Val Asn Phe Ile Lys  
130 135 140

Lys Val Val Leu Leu Asp Ser Lys Glu Asp Met Gly Glu Ala Gln Cys  
145 150 155 160

Leu Ser Asn Phe Met Ala Arg Tyr Ser Glu Pro Asn Leu Asp Val Arg  
165 170 175

Asn Phe Lys Pro Arg Asp Phe Asp Ala Lys Glu Gln Val Ala Leu Ile  
180 185 190

Met Ser Ser Ser Gly Thr Thr Gly Leu Pro Lys Gly Val Val Leu Thr  
 195 200 205

His Arg Asn Leu Ser Val Arg Phe Val His Cys Lys Asp Pro Leu Phe  
 210 215 220

Gly Asn Arg Thr Ile Pro Ser Thr Ser Ile Leu Ser Ile Val Pro Phe  
 225 230 235 240

His His Ala Phe Gly Met Phe Thr Thr Leu Ser Tyr Phe Ile Val Gly  
 245 250 255

Leu Arg Val Val Leu Leu Lys Arg Phe Glu Glu Lys Phe Phe Leu Ser  
 260 265 270

Thr Ile Glu Lys Tyr Arg Ile Pro Thr Ile Val Leu Ala Pro Pro Val  
 275 280 285

Met Val Phe Leu Ala Lys Ser Pro Leu Val Asp Gln Tyr Asp Leu Ser  
 290 295 300

Ser Ile Arg Glu Val Ala Thr Gly Gly Ala Pro Val Gly Thr Glu Val  
 305 310 315 320

Ala Val Ala Val Ala Lys Arg Leu Lys Ile Gly Gly Ile Leu Gln Gly  
 325 330 335

Tyr Gly Leu Thr Glu Thr Cys Cys Ala Val Leu Ile Thr Pro His Asp  
 340 345 350

Asp Val Lys Thr Gly Ser Thr Gly Arg Val Ala Pro Tyr Val Gln Ala  
 355 360 365

Lys Ile Val Asp Leu Thr Thr Gly Lys Ser Leu Gly Pro Asn Lys Arg  
 370 375 380

Gly Glu Leu Cys Phe Lys Ser Glu Ile Ile Met Lys Gly Tyr Phe Asn  
 385 390 395 400

Asn Lys Gln Ala Thr Glu Glu Ala Ile Asp Lys Glu Gly Trp Leu His  
 405 410 415

Ser Gly Asp Val Gly Tyr Tyr Asp Asp Asp Gly His Phe Phe Val Val  
420 425 430

Asp Arg Leu Lys Glu Leu Ile Lys Tyr Lys Gly Tyr Gln Val Ala Pro  
435 440 445

Ala Glu Leu Glu Trp Leu Leu Leu Gln His Pro Ser Ile Lys Asp Ala  
450 455 460

Gly Val Thr Gly Val Pro Asp Glu Ala Ala Gly Glu Leu Pro Gly Ala  
465 470 475 480

Cys Ile Val Leu Gln Glu Gly Lys Ser Leu Thr Glu Gln Glu Ile Ile  
485 490 495

Asp Tyr Ile Ala Glu Arg Val Ser Pro Thr Lys Arg Ile Arg Gly Gly  
500 505 510

Val Val Phe Val Asp Asp Ile Pro Lys Gly Ala Thr Gly Lys Leu Val  
515 520 525

Arg Ser Glu Leu Arg Lys Leu Leu Ala Gln Lys Lys Ser Lys Leu  
530 535 540

<210> 14

<211> 543

<212> PRT

<213> Mutant Rhagophthalmus ohbai Green Luciferase of the Invention

<400> 14

Met Ala Asn Glu Ile Ile Leu His Gly Ala Lys Pro Arg Asp Pro Leu  
1 5 10 15

Asp Leu Gly Thr Ala Gly Ile Gln Leu Tyr Arg Ala Leu Thr Asn Phe  
20 25 30

Ser Phe Leu Arg Glu Ala Leu Ile Asp Ala His Thr Glu Glu Val Val  
35 40 45

Ser Tyr Ala Asp Ile Leu Glu Asn Ser Cys Arg Leu Ala Lys Cys Tyr  
50 55 60

Glu Asn Tyr Gly Leu Arg Gln Asn Ser Val Ile Ser Val Cys Ser Glu

65		70		75		80
Asn Ser Thr Ile Phe Phe Tyr Pro Val Ile Ala Ala Leu Tyr Met Gly	85	90	95			
Val Ile Thr Ala Thr Val Asn Asp Ser Tyr Thr Glu Arg Glu Leu Leu	100	105	110			
Glu Thr Leu Asn Ile Ser Lys Pro Glu Leu Val Phe Cys Ser Lys Lys	115	120	125			
Ala Ile Lys Asn Met Met Ala Leu Lys Arg Asn Val Asn Phe Ile Lys	130	135	140			
Lys Val Val Leu Leu Asp Ser Lys Glu Asp Met Gly Glu Ala Gln Cys	145	150	155	160		
Leu Ser Asn Phe Met Ala Arg Tyr Ser Glu Pro Asn Leu Asp Val Arg	165	170	175			
Asn Phe Lys Pro Arg Asp Phe Asp Ala Lys Glu Gln Val Ala Leu Ile	180	185	190			
Met Ser Ser Ser Gly Thr Thr Gly Leu Pro Lys Gly Val Val Leu Thr	195	200	205			
His Arg Asn Leu Ser Val Arg Phe Val His Cys Lys Asp Pro Leu Phe	210	215	220			
Gly Thr Arg Thr Ile Pro Ser Thr Ser Ile Leu Ser Ile Val Pro Phe	225	230	235	240		
His His Ala Phe Gly Met Phe Thr Thr Leu Ser Tyr Phe Ile Val Gly	245	250	255			
Leu Arg Val Val Leu Leu Lys Arg Phe Glu Glu Lys Phe Phe Leu Ser	260	265	270			
Thr Ile Glu Lys Tyr Arg Ile Pro Thr Ile Val Leu Ala Pro Pro Val	275	280	285			
Met Val Phe Leu Ala Lys Ser Pro Leu Val Asp Gln Tyr Asp Leu Ser	290	295	300			

Ser Ile Arg Glu Val Ala Thr Gly Gly Ala Pro Val Gly Thr Glu Val  
 305 310 315 320

Ala Val Ala Val Ala Lys Arg Leu Lys Ile Gly Gly Ile Leu Gln Gly  
 325 330 335

Tyr Gly Leu Thr Glu Thr Cys Cys Ala Val Leu Ile Thr Pro His Asp  
 340 345 350

Asp Val Lys Thr Gly Ser Thr Gly Arg Val Ala Pro Tyr Val Gln Ala  
 355 360 365

Lys Ile Val Asp Leu Thr Thr Gly Lys Ser Leu Gly Pro Asn Lys Arg  
 370 375 380

Gly Glu Leu Cys Phe Lys Ser Glu Ile Ile Met Lys Gly Tyr Phe Asn  
 385 390 395 400

Asn Lys Gln Ala Thr Glu Glu Ala Ile Asp Lys Glu Gly Trp Leu His  
 405 410 415

Ser Gly Asp Val Gly Tyr Tyr Asp Asp Asp Gly His Phe Phe Val Val  
 420 425 430

Asp Arg Leu Lys Glu Leu Ile Lys Tyr Lys Gly Tyr Gln Val Ala Pro  
 435 440 445

Ala Glu Leu Glu Trp Leu Leu Leu Gln His Pro Ser Ile Lys Asp Ala  
 450 455 460

Gly Val Thr Gly Val Pro Asp Glu Ala Ala Gly Glu Leu Pro Gly Ala  
 465 470 475 480

Cys Ile Val Leu Gln Glu Gly Lys Ser Leu Thr Glu Gln Glu Ile Ile  
 485 490 495

Asp Tyr Ile Ala Glu Arg Val Ser Pro Thr Lys Arg Ile Arg Gly Gly  
 500 505 510

Val Val Phe Val Asp Asp Ile Pro Lys Gly Ala Thr Gly Lys Leu Val  
 515 520 525

Arg Ser Glu Leu Arg Lys Leu Leu Ala Gln Lys Lys Ser Lys Leu  
 530 535 540

<210> 15  
 <211> 543  
 <212> PRT  
 <213> Mutant Rhagophthalmus ohbai Orange Luciferase of the Invention

<400> 15

Met Ala Asn Glu Ile Ile Leu His Gly Ala Lys Pro Arg Asp Pro Leu  
 1 5 10 15

Asp Leu Gly Thr Ala Gly Ile Gln Leu Tyr Arg Ala Leu Thr Asn Phe  
 20 25 30

Ser Phe Leu Arg Glu Ala Leu Ile Asp Ala His Thr Glu Glu Val Val  
 35 40 45

Ser Tyr Ala Asp Ile Leu Glu Asn Ser Cys Arg Leu Ala Lys Cys Tyr  
 50 55 60

Glu Asn Tyr Gly Leu Arg Gln Asn Ser Val Ile Ser Val Cys Ser Glu  
 65 70 75 80

Asn Ser Thr Ile Phe Phe Tyr Pro Val Ile Ala Ala Leu Tyr Met Gly  
 85 90 95

Val Ile Thr Ala Thr Val Asn Asp Ser Tyr Thr Glu Arg Glu Leu Leu  
 100 105 110

Glu Thr Leu Asn Ile Ser Lys Pro Glu Leu Val Phe Cys Ser Lys Lys  
 115 120 125

Ala Ile Lys Asn Met Met Ala Leu Lys Arg Asn Val Asn Phe Ile Lys  
 130 135 140

Lys Val Val Leu Leu Asp Ser Lys Glu Asp Met Gly Glu Ala Gln Cys  
 145 150 155 160

Leu Ser Asn Phe Met Ala Arg Tyr Ser Glu Pro Asn Leu Asp Val Arg  
 165 170 175

Asn Phe Lys Pro Arg Asp Phe Asp Ala Lys Glu Gln Val Ala Leu Ile

180	185	190
Met Ser Ser Ser Gly Thr Thr Gly Leu Pro Lys Gly Val Val Leu Thr 195 200 205		
His Arg Asn Leu Ser Val Arg Phe Val His Cys Lys Asp Pro Leu Phe 210 215 220		
Gly Asn Arg Thr Ile Pro Ser Thr Ser Ile Leu Ser Ile Val Pro Phe 225 230 235 240		
His His Ala Phe Gly Met Phe Thr Thr Leu Ser Tyr Phe Ile Val Gly 245 250 255		
Leu Arg Val Val Leu Leu Lys Arg Phe Glu Glu Lys Phe Phe Leu Ser 260 265 270		
Thr Ile Glu Lys Tyr Arg Ile Pro Thr Ile Val Leu Ala Pro Pro Val 275 280 285		
Met Val Phe Leu Ala Lys Ser Pro Leu Val Asp Gln Tyr Asp Leu Ser 290 295 300		
Ser Ile Arg Glu Val Ala Thr Gly Gly Ala Pro Val Gly Thr Glu Val 305 310 315 320		
Ala Val Ala Val Ala Lys Arg Leu Lys Ile Gly Gly Ile Leu Gln Gly 325 330 335		
Tyr Gly Leu Thr Glu Thr Cys Cys Ala Val Leu Ile Thr Pro His Asp 340 345 350		
Asp Val Lys Thr Gly Ser Thr Gly Arg Val Ala Pro Tyr Val Gln Ala 355 360 365		
Lys Ile Val Asp Leu Thr Thr Gly Lys Ser Leu Gly Pro Asn Lys Arg 370 375 380		
Gly Glu Leu Cys Phe Lys Ser Glu Ile Ile Met Lys Gly Tyr Phe Asn 385 390 395 400		
Asn Lys Gln Ala Thr Glu Glu Ala Ile Asp Lys Glu Gly Trp Leu His 405 410 415		

Ser Gly Asp Val Gly Tyr Tyr Asp Asp Asp Gly His Phe Phe Val Val  
420 425 430

Asp Arg Leu Lys Glu Leu Ile Lys Tyr Lys Gly Tyr Gln Val Ala Pro  
435 440 445

Ala Glu Leu Glu Trp Leu Leu Leu Gln His Pro Ser Ile Lys Asp Ala  
450 455 460

Gly Val Thr Gly Val Pro Asp Glu Ala Ala Gly Glu Leu Pro Gly Ala  
465 470 475 480

Cys Ile Val Leu Gln Glu Gly Lys Ser Leu Thr Glu Gln Glu Ile Ile  
485 490 495

Asp Tyr Ile Ala Glu Arg Val Ser Pro Thr Lys Arg Ile Arg Gly Gly  
500 505 510

Val Val Phe Val Asp Asp Ile Pro Lys Gly Ala Thr Gly Lys Leu Val  
515 520 525

Arg Ser Glu Leu Arg Lys Leu Leu Ala Gln Lys Lys Ser Lys Leu  
530 535 540

<210> 16  
<211> 1638  
<212> DNA  
<213> Mutant Phrixothrix Green Luciferase

<400> 16  
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gacgcccaca ccaacgaggt gatctcctac gccagattt tcgaaaccag ctgccgcctg 180  
gccgtgagca tcgagcagta cggcctgaac gagaacaacg tgggtgggcgt ctgtagcgag 240  
aacaacatca acttcttcaa ccctgtgctg gccgccctgt acctcggcac cccagtggcc 300  
acctccaacg atatgtacac cgatggcgag ctgaccggcc acctgaacat ctccaagcca 360  
accatcatgt tcagctccaa gaaggccctg cccctgatcc tgagagtgca gcagaacctg 420  
agcttcatca agaaggtggt ggtgatcgac agcatgtacg acatcaacgg cgtggagtgc 480  
gtgtctacct tcgttgcccg gtacaccgac cacaccttcg acccaactgtc cttcacccca 540

aaggacttcg accccctgga gaagatcgcc ctgatcatgt catcctccgg caccaccggc	600
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tcgatgccca tacca	75

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gatgcccata c 71

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agaaaaatat ggcttgg 77

<210> 20  
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caatgtttgtg gcaat 75

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gcaacatcaa atgatat 77

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atatgtacac aga 73

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gccttatgtt t 71

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<210> 25  
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 atccagtgaa attta 75

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 aaagagtttg atccctt 77

<210> 28  
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<210> 30  
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<210> 33  
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 tcgagcttaa cggaat 77

<210> 34

<211> 73  
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<210> 35  
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 attgaaagta cat 73

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<210> 43

<211> 73

<212> DNA

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